Peat Spotter Landscape Intelligence Tool

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Rezatec Ltd., supported by the European Space Agency, is developing a **mapping**, **measuring** and **monitoring** service to assist a range of tropical and temperate peatland stakeholders in the more sustainable management of their carbon-rich resource.

The Issues

TROPICAL PEATLANDS
- Measure carbon balance to comply with sustainability standards[1] & to generate revenue through sales of carbon credits
- Monitor fire patterns & impact
- Avoid peatland areas when expanding plantations[2]

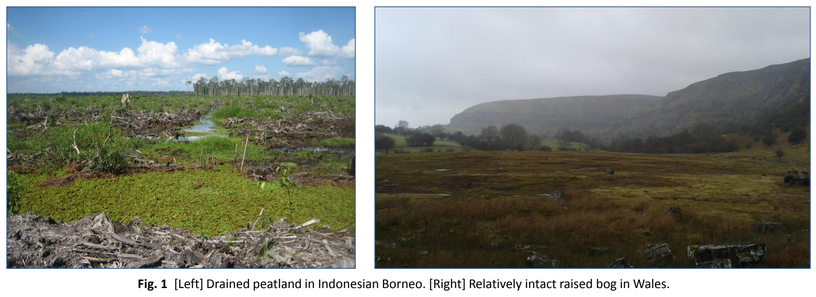


Fig. 1 [Left] Drained peatland in Indonesian Borneo. [Right] Relatively intact raised bog in Wales.

TEMPERATE PEATLANDS
- Sustainably manage water catchments in peat areas
- Monitor peatland integrity/restoration success for complying with UK Peatland Carbon Code[3]
- Manage multiple stakeholders in catchment, with diverse uses & impacts

The Solution

Fig. 2 Hand-held tablet used to map community boundaries & record other field data.

MAP....
- Areal extent and structure of peatland
- Community boundaries
- Anthropogenic features
- Vegetation types, e.g. peat swamp forest flora, sphagnum moss, indicator species

METHODS
- Participatory mapping approaches, e.g. walking boundaries with hand-held GPS-enabled tablets
- Satellite imagery, e.g. Landsat 8 & SPOT 6/7 images

MEASURE....
- Peat depth
- Below-ground carbon stock (e.g. of carbon accounting zone)
- Vegetation stress baseline

Fig. 3 Core extracted from peatland in Borneo.

METHODS
- Kriging analysis of existing depth data to develop peat substrate model
- Collection of further peat depth measurements at specific locations where data is lacking

MONITOR....
- Vegetation change over time
- Change in peatland integrity/restoration progress
- Fire incidence & impact

METHODS
- Processing of time-series of satellite/airborne imagery coupled with ground-truthing exercise
- World Resources Institute (WRI) Global Forest Watch Fire data[4]

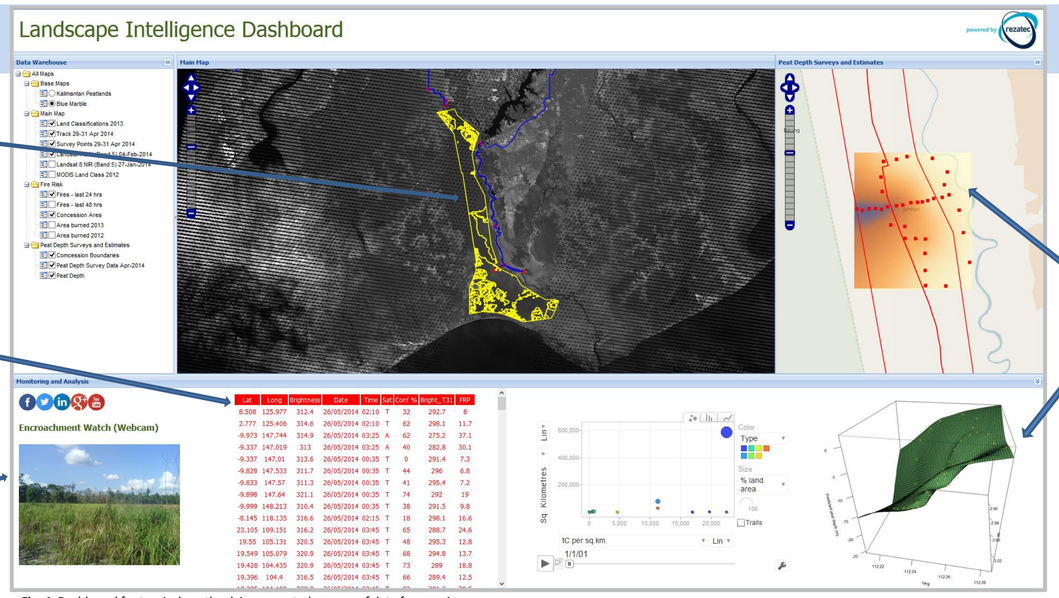
The Dashboard

- Online portal to display all data gathered in steps above
- Data transmitted via satellite communication systems straight from field to dashboard
- Variety of access options for different stakeholders
- On-going updates, e.g. fire incidence data[4]
- Various analytics possible, e.g. monthly change in forest cover

Carbon accounting area & basic vegetation zones are shown; finer-scale vegetation, community & oil palm plantation boundaries can be mapped & made available to all stakeholders to reduce potential land use/tenure conflicts

NASA FIRMS/WRI's GFW fire data[4] for the region of interest (updated daily on the Dashboard)

Activity within the concession & forest restoration progress can be monitored in real time through live updates from installed Webcams, & management adjusted as needed



Kriging analysis performed on peat depth data collected from the field, to produce a contour model of the peat depth.

Fig. 4 Dashboard for tropical peatland, incorporated a range of data from various sources.

Case Studies

BIODIVERSITY RESERVE, CENTRAL KALIMANTAN

- 64,977 ha of tropical peat swamp forest in Indonesian Borneo
- Ecosystem Conservation & Restoration Concession
- Registered as a REDD project under the Voluntary Carbon Standard (VCS)

Issues:
- Encroachment & drainage by oil palm plantations & community farms around periphery
- Fire incidence & damage

Management goals:
- Accurately map & monitor carbon accounting zone (derive carbon credits)
- Ensure carbon accounting area is maintained & enhanced
- Engage communities in sustainable peatland management

Peat Spotter Applications
- Community boundary mapping to secure land tenure
- Fire alert system to improve effectiveness of fire management
- Monitoring of restoration to assist in management of biodiversity in the reserve
- Monitoring change in the carbon accounting zone to ensure continued revenue from carbon credits
- Assisting plantation companies to comply with sustainability standards , e.g. RSPO P&C[1]

Fig. 5 Fire hotspots (yellow) reported[4] around the Biodiversity Reserve on 23rd September 2014.

Fig. 6 Example of a peatland area within the UK.

WATER CATCHMENT, UK

- 1000s ha of temperate, degraded (to some extent) peatland
- Predominantly open grazing & recreational land
- Often managed by Water Companies under the guidance of EU Water Framework Directive[5]

Issues:
- Reduction in quality of water extracted from catchment, due to high concentrations of pollutants, dissolved organic carbon & peat degradation
- Lack of knowledge on different land uses within catchment & impacts of such

Management goals:
- Create high resolution map of land cover & land uses in catchment
- Identify sources of pollution
- Identify anthropogenic disturbances & erosional features
- Monitor change in peatland integrity over time/effectiveness of restoration activities
- Engage with stakeholders to promote more sustainable catchment management

Peat Spotter Applications
- High resolution mapping of peat extent & structure; land cover & land uses, including all natural & anthropogenic features of significance
- Mapping of agricultural activities, e.g. cropping cycles & potential pollution flows
- Monitoring change in floral indicators of peatland integrity over time
- Identify hotspots of degradation & thus priority targets for restoration
- Documenting local & regional land use activities through a shared online dashboard

REFERENCES
[1]e.g. RSPO Principles & Criteria for reducing greenhouse gas emissions - http://www.rspo.org/en/greenhouse_gas_working_group_2
[2]e.g. If a company is part of the Sustainable Palm Oil Manifesto - http://www.musimmas.com/sustainability/sustainable-palm-oil-manifesto
[3] Reed, M.S. *et al*. (2013) *Peatland Code Research Project Final Report, Defra, London.* http://www.cbd.int/financial/pes/unitedkingdom-peatland.pdf
[4]WRI Global Forest Watch (GFW) Fires - http://fires.globalforestwatch.org/, or NASA FIRMS data - https://firms.modaps.eosdis.nasa.gov/firemap
[5]European Union Water Framework Directive - http://ec.europa.eu/environment/water/water-framework/info/intro_en.htm

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